Claims

What is claimed is:

1. A device, comprising:

an input fiber to receive input light;

an output fiber;

a first fiber;

a second fiber;

a fiber coupler having a first port coupled to said input fiber and said output fiber, and a second port coupled to said first and said second fibers to split said input light into a first beam in said first fiber and a second beam in said second fiber and to mix and couple optical signals from said first and said second fibers into said output fiber;

a first reflector coupled to said first fiber to reflect said first beam back to said fiber coupler;

a second reflector coupled to said second fiber to reflect said second beam back to said fiber coupler;

a fiber tuning mechanism coupled to at least one of said first and said second fibers to change a relative delay in said first and said beams upon reflection to back said fiber coupler;

an optical detector coupled to receive light from said output fiber to produce a detector output having information on

optical interference between said first and said second beams received at said fiber coupler;

an analog-to-digital converter coupled to convert said detector output into a digital signal; and

a processing device receiving and performing a FFT processing on said digital signal to extract spectral information in said input light.

2. The device as in claim 1, further comprising a control circuit coupled to said processing device and to said fiber tuning mechanism to synchronize said FFT processing with a tuning in said relative delay.

3. The device as in claim 2, further comprising:

a tap fiber coupler in said input fiber to split a reference beam from said input light; and

a reference detector to convert said reference beam into a power indicating signal indicative of a power variation in said input light, wherein said control circuit is coupled to receive said power indicating signal and calibrates said FFT processing to account for a power variation in said input light.

4. The device as in claim 1, further comprising a variable optical attenuator in at least one of said first and said second

fibers to control a relative optical power levels in said first and said second fibers.

5. The device as in claim 1, wherein each of said first and said second reflectors is a Faraday rotator reflector.

6. The device as in claim 5, wherein each Faraday rotator reflector includes a 45-degree Faraday rotator and a reflector.

7. A method, comprising:

splitting an input optical signal into first and second optical signals in first and second optical paths, respectively;

reflecting each of the first and second optical signals back with polarization in reflection to be orthogonal to polarization of light prior to reflection;

spatially overlaping reflected first and second optical signals to interfere with each other to produce a mixed output optical signal;

converting the mixed output optical signal into an electronic signal; and

applying a fast Fourier transform (FFT) on the electronic signal to extract spectral information in the input optical signal.

8. The method as in claim 7, further comprising using a Faraday rotator reflector to perform the reflecting of each of the first and second optical signals.

9. The method as in claim 7, further comprising using optical fiber to guide each optical signal.

10. The method as in claim 7, further comprising adjusting at least one of the first and the second optical paths to change a difference in the optical path lengths of the first and the second optical paths in response to the spectral information from the FFT.

11. The method as in claim 7, further comprising adjusting a power level of at least one of the first and second optical signals.

12. The method as in claim 7, further comprising:

monitoring a variation in the input optical signal; and

using the variation in the FFT to produce the extracted spectral information that accounts for the variation.

13. A device, comprising:

an optical coupler to receive an input optical signal and to split the input optical signal into a first optical signal and a second optical signal;

a first optical path to receive the first optical signal from the optical coupler, the first optical path comprising a first reflector that reflects light back and makes polarization of reflected light to be orthogonal to polarization of light incident to the first reflector prior to reflection;

a second optical path to receive the second optical signal from the optical coupler, the second optical path comprising a second reflector that reflects light back and makes polarization of reflected light to be orthogonal to polarization of light incident to the second reflector prior to reflection, wherein the optical coupler combines and mixes reflections of the first and the second optical signals to produce an optical output signal having interference information between the reflections

an optical detector coupled to receive the optical output signal from the optical coupler and produces an electronic signal from the optical output signal; and

a processing circuit to perform a fast Fourier transform on the electronic signal to extract spectral information in the input optical signal.

14. The device as in claim 13, further comprising an optical attenuator in at least one of the first and second optical paths to adjust a relative power level of one of the first and the second optical signals relative to another.

15. The device as in claim 13, further comprising an adjustment device in at least one of the first and second optical paths that adjusts a difference in optical path lengths of the first and second optical paths.

16. The device as in claim 15, wherein the adjustment device is coupled to receive output from the processing circuit and is operable to adjust the difference in response to the output.

17. The device as in claim 13, wherein the first reflector comprises a Faraday rotator and a reflector.